



**Safety Centre
IIT Gandhinagar**

International Conference on Safety

December 2-6, 2014
Indian Institute of Technology Gandhinagar

CONFERENCE PROGRAM

... promoting a culture of safety



Conference Overview

WORKSHOP ON PROCESS SAFETY EDUCATION BY PROF. DAN CROWL	
Dec 2, 2014	

INTERNATIONAL CONFERENCE ON SAFETY	
Dec 3, 2014	
9:00 – 10:30	Conference Opening & Plenary Session A
10:30 – 11:00	Tea & Networking
11:00 – 13:00	Plenary Session B
13:00 – 14:00	Lunch
14:00 – 15:30	Parallel Sessions 1 – 3
15:30 – 16:00	Tea & Networking
16:00 – 17:30	Parallel Sessions 4 – 6
18:45	Cultural Program
20:00	Conference Dinner & Networking
Dec 4, 2014	
9:00 – 11:00	Plenary Session C
11:00 – 11:30	Tea & Networking
11:30 – 13:00	Parallel Sessions 7 – 9
13:00 – 14:00	Lunch
14:00 – 15:30	Parallel Sessions 10 – 12
15:30 – 16:00	Tea & Networking

SYMPOSIUM ON PROCESS SAFETY	SHORT COURSE ON DESIGN & SAFETY OF STRUCTURES UNDER FIRE
Dec 5 & 6, 2014	Dec 5 & 6, 2014

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3 Dec 2014, 14:00 – 15:30

Session 1: Process Monitoring & Alarm Management

Session Chair: **Dr. Babji Srinivasan** (IIT Gandhinagar)

ID	Authors	Title of Presentation
	Keynote Address by Dr. Raghunathan Rengaswamy Professor, Indian Institute of Technology Madras	<i>Diagnostics for Safe Process Operations - Trends, Gaps and Perspectives</i>
61	Chandresh Sharma, Punit Bhavsar, Babji Srinivasan and Rajagopalan Srinivasan (IIT Gandhinagar)	Cognitive Studies in Process Control using Eye Gaze Tracking
31	Gurumoorthy Vishwanathan (Indian Petrochemicals Corporation)	Alarms Management in Hydrocarbon plants
75	Kallol Roy (Bhabha Atomic Research Centre)	Sensor Uncertainty, Error Budgeting & EMI Aspects in Design, Calibration & Ageing Management of Safety Class Instrumentation

Session 2: Process Safety

Session Chair: **Dr. Hyuckmyun Kwon** (OS & H Research Institute Korea)

ID	Authors	Title of Presentation
22	Prashant Srivastava and Shishir Sinha (IIT Roorkee)	Event tree analysis of ethylene release from ethylene vaporization unit
29	Vaishali Umrigar and Kartik Gonawala (SCET, Surat)	Treatment of Ferric compounds to Produce Ferrous Sulphate as an Alternative to Waste Disposal
36	Sabyasachi Behera (CITE, Rourkela)	Safety in Chemical Industries
79	Aditya Samant and Rajagopalan Srinivasan (IIT Gandhinagar)	Identifying Patterns in CSB Accident Investigations using Text Mining

Session 3: Risk Analysis & Mitigation

Session Chair: **Dr. Atul Bhargav** (IIT Gandhinagar)

ID	Authors	Title of Presentation
18	Ankur Kumar (Institute of Disaster Management and Fire Science)	Occupational Risks in Electronics Manufacturing Industry and Controls thereof
38	Sandip Roy (IIT Bombay)	Determining Individual Public Risk Acceptance Criteria: An Economic Model
26	Debi Prasad Tripathy (NIT Rourkela)	Safety Risk Analysis and Management Techniques in Coal Mines
51	Saeed Nazari, Noraddin G, Najmeh K & Masoom Nazari (Ardabil University of Medical Sciences)	Risk based maintenance (RBM) modeling of petrochemical industry using FAHP- Delphi techniques

Debi Prasad Tripathy. *Safety Risk Analysis And Management Techniques In Coal Mines*

Abstract: Risk assessment and risk management is inherently about the management of unplanned events. Unplanned events which occur on a mine site have the potential to impact on the viability of a mine. The process of assessing and managing these risks is aimed at reducing the likelihood that these negative events will occur and increasing the likelihood that positive outcomes will be realised. In the 11th Safety Conference held on 4th & 5th July, 2013 at New Delhi, DGMS recommended that every mine should employ a sound risk analysis process, should conduct risk assessment, and should develop a safety management plan to address the significant hazards identified by the analysis/ assessment. A lot of emphasis is given by DGMS for training of mining professionals in coal industry in effective risk assessment with experience and training imparted through SIMTARS, Australia.

Coal mines are highly hazardous in nature and workers are prone to several risk conditions during working which may endanger/cause loss of life, serious bodily injury with direct and indirect cost to employers and employees. The dangers may be caused from roof fall, gas poisoning, fire, inundation, explosion, electricity and several other potential sources. To minimize the adverse effects, risks in coal mines need to be identified, analyzed, evaluated qualitatively and quantitatively using state-of-the-art methodologies and software so that follow up prevention, control or elimination measures may be initiated to minimize associated risks and consequences. Risk analysis and assessment techniques are classified into three main categories: (a) the qualitative, (b) the quantitative, and (c) the hybrid techniques (qualitative-quantitative, semi-quantitative).

This paper comprehensively discusses the different qualitative and quantitative and hybrid approaches for risk assessment and management with reference to coal mines. Application of risk analysis techniques for assessment of fire, event tree analysis, HAZOP etc have been illustrated.

**Saeed Nazari, Noraddin Ghanbari, Masoom Nazari and Najmeh Karami.
*Risk based maintenance (RBM) modeling of petrochemical industry using FAHP - Delphi techniques***

Abstract: The progress of technology has caused operating of many processes and resulted in more complexity of the chemical process industries and one of the main challenges for these companies is to manage the existing assets in the comprehensive and complex infrastructure. Thus, the safe operations of these systems are at least as important as their design. It should be noted; despite of implementing safety programs in today's industry, accidents still occur, and OSHA believes that all of these accidents follow typical patterns that help analysts to recognize their root cause and take proper actions. On the other hand, the cost of maintenance is a considerable part of the total life cycle in these industries. Research has shown that some critical components account for most of the downtime in such operations. An improvement of maintenance practices which focused on risk based approach for critical components can improve the reliability and safety; at the same time can reduce maintenance costs. So, in order to reach a comprehensive risk management plan for these processes, we aim to prepare a domestic risk management model for chemical process based on Risk Based Maintenance (RBM) using FAHP technique. The initial steps involve literature review to identify critical assets and equipment. The subsequent interviews will be discussed these issues with experienced practitioners to identify their failures. The Delphi group method has been selected for data collection. Through three rounds of Delphi process experts helped to filter all the information to come up with a series of the most important strategic actions to RBM assessment of the systems. All of the RBM criteria have been localized by expert team and the risk number could be calculated according to these factors. There are several tools to analyze the risks of them. But, the classic approach always comes with great uncertainty. Thus, The FAHP model will be introduced as the most applicable approach for modeling of the risk management to overcome such limitations. However, by applying this technique, it will be anticipated that the safety of system improved, the environmental impacts and maintenance costs reduced, the spare parts allocated where necessary, and finally lead to prioritization of the process's safety measures according to their risk levels.

About Safety Centre @IIT Gandhinagar

The objective of the IIT Gandhinagar Safety Centre is to promote safety in public and private spheres, industry and the informal sector. The Safety Centre advances these objectives with activities to:

Discover - Research projects, consultancy and project implementation. Promoting awareness and undertaking public advocacy around safety: Safety centre undertakes a vigorous program of safety research, consultation and project implementation in the formal and informal sector. Some of the major consultancy projects currently in progress include Seismic design criteria for metro structures for MEGA, Identification of an Optimal Disinfectant for the Preservation of RO Purified Water and Safe Cities. Several research projects at PhD and Master's level have been undertaken by Faculty like computational modelling of condensed phase aerosol, cognitive engineering for process safety, study of human factors in process control and alarm management directed towards preventing accidents in chemical plants and design of inherently safe chemical plants. A number of undergraduate projects have also been initiated including development of an Indian Fire incident Database and development of an Android App for fire reporting.

Teach: IIT Gandhinagar endeavours to develop and integrate safety related courses into its graduate and undergraduate curriculum. Safety related elective courses currently being offered include Introduction to Fire Engineering, Fundamentals of Chemical Process Safety and Design of structures under fire. IIT Gandhinagar has also become a member of Safety and Chemical Engineering Education SACHE program of the American Institute of Chemical Engineers (AIChE) Which provides teaching material and programs that bring elements of process safety into student curriculum and also access to a wide range of educational materials prepared by AIChE's Centre for Chemical Process Safety for the students. Regular Industry visits and field trips are arranged for students for a first-hand view of how the concepts covered in classes translate to industrial practice. Safety centre is also exploring the potential of developing minor courses and certificate, graduate programs in industrial safety in the coming years.

Outreach: Safety Centre conducts conferences, workshops, seminars and training for Researchers, academicians, safety professionals and policy makers around the world to advance their expertise, professional knowledge and skills and to introduce them to the state-of-the-art. Several Workshops, professional Training programs and short courses have been organized by the centre covering Disaster Mitigation, Confined Masonry, Process Safety Management, Seismic Retrofitting, Seismic Design of Reinforced Concrete Buildings and Earth and Rock filled Dams, Fire Safety, geotechnical Aspects of Earthquake Engineering, Soil Structure Interaction, Fire Investigation, Enclosure Fire Dynamics, Industrial Hazard Identification and Process safety. In addition, centre organizes a biennial International Conference on Safety (ICS) covering all areas of safety (Design and Operations, Regulations and Standards, Planning and Economics, Risk management, Testing, behavioural and occupational safety) spread across various sectors such as Buildings and structures, consumer, fire, industrial, process, construction and transportation and informal sectors. A symposium on process safety (SPS) with special focus on process safety is also organized by the centre every year.

Practice: Safety Centre oversees and Monitors safety at Institute level and ensures safe working environment in all laboratories and all aspects of institute operations. Safety committee has formulated policies, developed a safety manual and conducts regular training programs for staff and students. The safety management system also undertakes regular checks, audits, inspections; incident investigation and proper follow up.

Safety Centre

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